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AUTHOR	Dees, James W.
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INSTITUTION	Human Resources Research Organization, Alexandria, Va.
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ABSTRACT

In order to test the ubiquity of the structure of the intellect for predictors of performance, a psychomotor skill (M 16 rifle proficiency test), a measure of perseverance (completion or resignation from OCS Program), and a measure of leadership ability (peer ratings) were selected as criteria on which multiple regressions were conducted with a battery of 37 tests of different elements of the structure of the intellect. A functionally significant correlation with any of the three criteria would support a rationale for greatly increased work in that area. Functionally significant correlations for all three criteria would support a unified theory of human potential. Subjects were 100 OCS candidates at Fort Benning, Ga. The p.05 level of significance for the multiple R was used as the criterion for selecting the terminal step in the multiple regression program. The Pearson and Biserial correlations among the pairs of criteria are: (1) peer ratings with M 16 scores--r=.21; (2) peer ratings with course completion--r=.23; and (3) M 16 scores with course completion--r=.06. The data obtained support a unified theory of human potential and have wide implications for intelligence testing, personality theory, and prediction of performance. (Author/KM)

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COMPLEX INTELLECT vs THE IQ TEST AS A PREDICTOR OF PERFORMANCE

James W. Dees

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HumRRO
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Complex Intellect vs the IQ Test as a Predictor of Performance

James W. Dees
Human Resources Research Organization

Guilford's structure of the intellect has traditionally been considered a refinement of intelligence testing. However, it is becoming increasingly obvious that the structure of the intellect has a significant impact upon skills not usually associated with intelligence. Guilford (1968) comments on this in his chapter on the propriety of creativity as an area of research. He points out that one theory of creativity is a theory of the entire personality, including intelligence. According to this theory, a factorial evaluation of an individual's intellectual profile should provide substantial insight not only into his academic performance, but also into performance in areas formerly considered to be determined by personality characteristics outside the pale of intelligence testing. This viewpoint is supported by the fact that Witkin (1965), in his treatment of cognitive style, concludes that cognitive style may be related to personality characteristics. Guilford has incorporated cognitive style, as measured by the Embedded Figures Test, into the Guilford System.

In order to test the ubiquity of the structure of the intellect for predictors, a psychomotor skill, a measure of perseverance, and a measure of leadership ability were selected as criteria on which multiple regressions were conducted with a battery of 37 tests of different elements of the structure of the intellect. A functionally significant correlation with any of the three criteria would support a rationale for greatly increased work in that area. Functionally significant correlations for all three criteria would support a unified theory of human potential. Functional significance implies statistically significant relationships of sufficient strength to be of practical value.

Method

Subjects

The 93d Officer Candidate Company at Fort Benning, Georgia, provided our subject pool. Of the 220 men available from that Company, 186 participated in the first of five two-hour testing sessions. By the end of the fifth testing session, all but 100 of these Ss had been eliminated. Fifty-five were eliminated for having missed one or more of the test sessions, and 31 for inappropriate responses to one or more of the tests. Most of the inappropriate responses were apparently due to misunderstanding the instructions.

Tests

Table 1 furnishes a listing of the 37 tests administered in this study. These are all group-administered tests. With one exception, each test represents a separate element in Guilford's system. An "estimation of length" test, not classified in the Guilford system, was included for reasons irrelevant to this discussion.

Criteria

The following criteria were used in this study:

1. Leadership (peer ratings)

2. Perseverance (completion or resignation from OCS Program)

3. Psychomotor skill (M 16 rifle proficiency test)

Completion of OCS is seldom based on any academic consideration. Only 16 of the entire complement of 220 men from the 93d OC Company were "boarded out" for academic reasons, while 76 resigned. Of the 100 Ss tested, 66 completed the course.

Procedure

The peer ratings were obtained as follows:

1. During the eighth week of OCS, each man rates each of the members of his platoon on a device popularly known as a "bayonet sheet." The ratings consist of the sum of separate 0 to 5 ratings on each of 20 separate characteristics. The characteristics are (a) adaptability, (b) ambition, (c) appearance, (d) attention to duty, (e) cooperation, (f) dependability, (g) enthusiasm, (h) expression, (i) force, (j) ingenuity, (k) initiative, (l) intelligence, (m) judgment, (n) loyalty, (o) moral courage, (p) self-discipline, (q) self-improvement, (r) stamina, (s) tact, and (t) understanding. Each of these is accompanied by a short definition.

2. The mean of the total ratings for each man, rounded to the nearest integer, was used as his peer rating.

3. The ratings within each of the five platoons were then transformed to obtain arbitrary means and standard deviations of 25 and 1 respectively.

4. The converted ratings from all platoons were then combined.

The rifle proficiency tests are routinely given during OCS. At this point, all of the men had completed their marksmanship training. Five two-hour test sessions were conducted according to the following schedule beginning in the third week of a 23-week course:

Table 1

Tests Used as Predictors in Experiment 1

Test No.	Test	Author	Availability[a]
1	Paper Folding	ETS	ETS
2	Gestalt Transformation	Sheridan Supply Company	Sheridan
3	Sentence Order	J. P. Guilford	Sheridan
4	Number Combinations	J. P. Guilford	Sheridan
5	Seeing Deficiencies	J. P. Guilford	Sheridan
6	Word Grouping	J. P. Guilford	Sheridan
7	Sequential Association	J. P. Guilford	Sheridan
8	Cube Comparison	ETS	ETS
9	Word Changes	J. P. Guilford	Sheridan
10	Number Grouping	J. P. Guilford	Sheridan
11	Associations IV	J. P. Guilford	Sheridan
12	Sentensense	J. P. Guilford	Sheridan
13	Verbal Classification	J. P. Guilford	Sheridan
14	Number Rules	J. P. Guilford	Sheridan
15	Symbol Grouping	J. P. Guilford	Sheridan
16	Planning Elaboration	J. P. Guilford	Sheridan
17	Similarities	J. P. Guilford	Sheridan
18	Letter Sets	ETS	ETS
19	Estimation of Length	ETS	ETS
20	Auditory Number Span	HumRRO	HumRRO
21	Class Name Selection	J. P. Guilford	Sheridan
22	Object Number Test	ETS	ETS
23	Word Relations	J. P. Guilford	Sheridan
24	Verbal Retention	James W. Dees (HumRRO)	HumRRO
25	Alternate Methods	J. P. Guilford	Sheridan
26	Extended Range Vocabulary	ETS	ETS
27	Number Comparison	ETS	ETS
28	Verbal Analogies	J. P. Guilford	Sheridan
29	Embedded Figures Test	Dees, O'Reilly, Sennett (HumRRO)	HumRRO
30	Addition Test	ETS	ETS
31	Nonsense Syllogisms	ETS	ETS
32	Sequence Memory	James W. Dees (HumRRO	HumRRO
33	Things Categories	ETS	ETS
34	Letter Series	J. P. Guilford	Sheridan
35	Word Endings	ETS	ETS
36	Sentence Completion	James W. Dees (HumRRO)	HumRRO
37	Word-Group Naming	J. P. Guilford	Sheridan

[a]ETS--Educational Testing Service
Sheridan--Sheridan Psychological Service, Inc.
HumRRO--Human Resources Research Organization

Friday, 11 July 1969	Tests 1-7
Saturday, 12 July 1969	Tests 8-12
Saturday, 26 July 1969	Tests 13-19
Saturday, 2 August 1969	Tests 20-28
Saturday, 9 August 1969	Tests 29-37

Results

Stepwise multiple regressions were obtained on the 37 predictors for each of the criteria. This resulted in the multiple correlation coefficients given in Table 2, and the regression equations given in Table 3. The $p < .05$ level of significance for the multiple R was used as the criterion for selecting the terminal step in the multiple regression program. The Biserial was used as the measure of correlation for the tests with the course completion criterion. Estimates of the shrunken multiple correlation, based upon Wherry's formula (1931) are given in Table 2. The Pearson and Biserial correlations among the pairs of criteria are:

Peer Ratings with M 16 Scores: $r = .21$

Peer Ratings with Course Completion: $r = .23$

M 16 Scores with Course Completion: $r = .06$

Discussion

Guilford, in his book (1968), considered the factors of the intellect to be potentially valuable as predictors in education. He emphasized that these factors should not only predict general intelligence, but also creativity, and hinted of a possible ubiquity of these factors into areas formerly considered the domain of personality theory. This study has demonstrated that these tests can predict a psychomotor skill, a measure of leadership, and perseverance in a particularly difficult course of training.

General intelligence tests have never predicted these types of criteria well. It is important to emphasize why these abilities are simultaneously not well predicted by general intelligence tests, but are well predicted by multiple regressions based on tests of intellectual factors. A glance at the regression equations given in Table 3 reveals that many of the weightings are negative in value. Thus, intellectual factors which are positively related to some abilities, are negatively related to others. A general intelligence score is the algebraic summation of scores on an unspecified number of intellectual factors. The factors positively correlated with a given ability are cancelled by those having a negative relationship. The result is a relatively low correlation of general intelligence with many abilities. However, the use of multiple regression techniques and predicting from a variety of intellectual factors with specific

Table 2

Multiple Correlation Coefficients

Criterion	R	df	F	P	R^2
Peer Ratings	.64	29 & 70	1.65	$p < .05$	.41
Course Completion	.907	33 & 66	9.31	$p < .001$	.86
M 16 Rifle Score	.68	33 & 63	1.62	$p < .01$	.44

Table 3

Coefficients and Constants for Regression Equations

Tests	Peer Rating	OCS Dropouts	M16 Rifle
1	0.0187	0.0139	
2		-0.0104	-0.3196
3		0.0212	0.4179
4	0.0201	0.0259	0.1953
5	-0.0137	-0.0139	0.1583
6			-0.0790
7	0.0267	0.0580	0.9444
8	0.0098	0.0224	0.1527
9	-0.0030	-0.0306	-0.2161
10	-0.0199	-0.0373	0.4885
11	0.0121	0.0146	-0.1559
12	-0.0154	-0.0596	-0.3272
13	-0.0030	0.0210	0.1240
14		0.0174	0.1167
15	0.0032		0.1183
16	0.0123	0.0205	-0.1110
17	-0.0045	-0.0253	-0.1710
18			-0.5661
19		0.0146	-0.0703
20	-0.0174	-0.0102	0.5806
21	0.0099	0.0529	0.3283
22	0.0074	-0.0125	
23	-0.0088	-0.0106	-0.1767
24	-0.0119	-0.0146	0.3348
25	-0.0287	-0.0148	-0.4332
26	0.0106	-0.0091	
27	0.0033	0.0095	-0.0955
28	-0.0232	0.0188	-0.2786
29	0.0025		0.1790
30	0.0014	0.0013	0.1734
31	0.0112	0.0199	-0.2746
32	0.0155	0.0041	0.3121
33			0.5547
34	-0.0125	-0.0510	-0.0495
35		-0.0063	
36	-0.0093	-0.0139	-0.1265
37	-0.0214	0.0838	-0.3053
Constant Term	25.2238	-0.4934	35.0620

subtests avoids this problem. For example, the Pearson correlation of the Armed Forces Qualification Test (AFQT) with M 16 rifle marksmanship is .18, while the multiple with the 37 tests is .68.

An embedded figures test was one of the 37 tests administered in this study. Witkin has often suggested this test as a measure of a personality variable (Witkin et al., 1962). Perhaps Witkin's suggestion concerning the personality implications of his field independence-dependence continuum should be broadened to include the entire spectrum of intellectual factors. The structure of the intellect as defined by a test profile may reveal an aggregate of abilities which would include many of those commonly associated with personality theory.

These data also support an explanation for another old question. Why do human beings have the intelligence range which they possess? Natural variability within the species aside, why is the general intelligence of the human species, or any other species, generally restricted to a specific range? One explanation immediately related to the present work is that the relatively high survival of certain skills not only places a premium on intelligence specific to given areas but also may place a premium on stupidity in other areas. The populations interbreed producing a wide variety of intelligence profiles. The survival value of these profiles is determined by the ecology. The algebraic summation of the intelligence factors as they relate to survival associated skills, will not necessarily yield a continually positive relationship between general (or gross) intelligence and survival value. For a given set of environmental conditions, there may be an optimum range of general intelligence, reflecting the algebraic complexities of a series of optimal or near optimal intelligence profiles.

These data, in their support of a unified theory of human potential, should impact upon both theoretical and applied research. To the theoretician, additional support of an ubiquitous theory should be a welcome simplification. To the practitioner, and the applied researcher, a unified theory of human potential offers opportunities for prediction overlooked in the past.

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